

true state of the case. The rainfall that has been withheld from the United States represents but an utterly insignificant fraction of the total quantity of moisture in the atmosphere, and its retention in the air can have but little effect on the phenomena that may have occurred elsewhere. If, as is most probable, the moisture is fairly well distributed throughout the atmosphere, it will not be practicable with our present knowledge to ascertain where that which is withheld from us should descend as rain. In fact, the collection of data relative to weather in distant regions, so far as we have at present progressed, suggests the possibility that droughts have occurred this year in almost all regions from which we have meteorological reports, whence we may conclude that the atmosphere is, on the average, slightly drier than usual, possibly the tenth or the hundredth part of 1 per cent, a conclusion to which, in fact, we were led by a study of the winds in some editorial remarks on page 337 of the September REVIEW. This conclusion is, in fact, the very opposite of that suggested by our correspondent, whose words imply that there must on the average be the same amount of rainfall annually all over the globe, as a whole, and that, therefore, a diminished rainfall over the United States, together with increased evaporation, necessarily means that the atmosphere has, temporarily, a larger charge of moisture than usual.

If we accept as a working hypothesis the idea that the whole atmosphere can have appreciably less moisture one year than another, we are led then to inquire as to the reason for this. Several reasons may be suggested as equally plausible. The first is purely mechanical, and rests upon the conclusion, which now amounts almost to a demonstration, that the average condition of the atmosphere as a whole may vary from year to year in an irregular way precisely as the annual average condition is known to vary for any given station, and even for large sections of the country. We have no right to assume that the average temperature or moisture, or movement, or pressure of the atmosphere of the whole globe will be the same from year to year any more than that the local station averages will be the same. This is equivalent to recognizing the fact that the atmospheric phenomena do not and can not go through short cycles only, but must necessarily also go through many long cycles, and that none of these are necessarily recurrent. In technical terms we should say that atmospheric phenomena are not a case of steady motion.

A second hypothesis that may be plausibly suggested is that the cause of these irregularities lies outside of the earth, and may be due to the irregularities in the quantities of heat sent to us from the sun from year to year. It has been plausibly argued from the observations of temperature that there is a periodicity in the solar radiation parallel to that of the sun spots, so that the whole atmosphere receives more heat, and consequently must have a little more moisture, and perhaps yield more rains and storms when the sun spots are most numerous. But this hypothesis does not seem to be needed at present.

THE EXTENT OF A LOCAL RAIN.

In continuation of our remarks in the September REVIEW as to the limiting area of what may be called a local storm we append the following table showing the details of the rainfall at Jupiter, Fla., and at Hypoluxo, which is 33 miles south of that station and about the same distance from the seashore. At Jupiter the coast line trends north-northwest and south-southeast, but at Hypoluxo the trend is more nearly north and south. The maximum monthly rainfalls usually occur on this coast in either August or September, but for the present year they have occurred in October, and have been heavier at Jupiter and Hypoluxo than any other region. The following table gives the rainfall, measured daily at 8 a. m.

and 8 p. m. at Jupiter, and in the next columns the total rain at each station for the twenty-four hours preceding 8 a. m. of the respective dates. These falls were usually heavier during the twelve hours, 8 p. m. to 8 a. m., than during the daytime; they were almost invariably accompanied by north, east, or northeast winds attending cyclonic disturbances to the eastward. The differences in the 24-hour rainfall up to 8 a. m. of each day, as given in the last columns of this table, show how very local the heavy rainfalls must have been, and how many stations are necessary for the proper presentation of the distribution of heavy rainfall over any country, even a flat and uniform land, like Florida:

Daily Rainfall, October, 1895.

Date.	Jupiter.		8 p. m. + 8 a. m. daily.		Date.	Jupiter.		8 p. m. + 8 a. m. daily.	
	8 a. m.	8 p. m.	Jupl-ter.	Hypo-luxo.		8 a. m.	8 p. m.	Jupl-ter.	Hypo-luxo.
September 30.	.....	0.10	.....	.....	October 17.	0.54	0.08	0.69	0.99
October 1.	0.10	1.72	0.20	0.72	18.	2.97	1.37	3.00	1.00
2.	T.	T.	1.72	0.12	19.	0.48	0.00	1.85	0.94
3.	0.08	0.06	0.08	0.00	20.	0.01	1.84	0.01	3.45
4.	0.02	0.00	0.08	0.00	21.	2.00	0.90	3.84	4.05
5.	0.00	0.00	0.00	0.00	22.	2.30	0.06	3.20	0.00
6.	0.00	0.00	0.00	0.00	23.	0.00	0.00	0.06	0.00
7.	0.00	0.00	0.00	0.00	24.	0.00	0.00	0.00	0.00
8.	0.00	0.00	0.00	0.00	25.	0.00	0.00	0.00	0.00
9.	0.00	0.21	0.00	1.15	26.	0.00	0.00	0.00	0.00
10.	1.84	0.18	2.05	0.04	27.	0.00	0.00	0.00	0.00
11.	0.00	0.00	0.18	0.00	28.	0.00	0.00	0.00	0.00
12.	0.18	0.16	0.18	0.33	29.	T.	0.87	T.	1.33
13.	T.	T.	0.16	0.00	30.	0.08	0.01	0.90	0.00
14.	0.00	0.00	0.00	0.00	31.	0.00	0.00	0.01	0.00
15.	1.82	0.82	1.52	1.74					
16.	0.58	0.15	1.40	1.03					
						12.65	8.38	21.13	24.39

OBSERVATIONS AT HONOLULU.

Meteorological observations at Honolulu, Republic of Hawaii, by Curtis J. Lyons, Meteorologist to the Government Survey.

Pressure is corrected for temperature and reduced to sea level, but the gravity correction, -0.06, is still to be applied.

The absolute humidity is expressed in grains of water, per cubic foot, and is the average of four observations daily.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 10.

The rainfall for twenty-four hours is given as measured at 6 a. m. on the respective dates.

August, 1895.	Pressure at sea level.			Temperature.				Humidity.			Wind.		Cloudiness.	Rain measured at 6 a. m.
	9 a. m.	8 p. m.	9 p. m.	6 a. m.	8 p. m.	9 p. m.	Maximum.	Minimum.	Relative.	Absolute.	Direction.	Force.		
1.	Ins.	Ins.	Ins.	o	o	o	o	o	%	%			Ins.	Ins.
2.	30.00	29.94	29.98	77	82	88	86	77	71	74	7.6	ne.	5-8	8 0.07
3.	29.99	29.94	29.97	78	78	78	78	76	80	79	8.4	ene.	6	10 0.06
4.	30.00	29.95	30.00	78	80	77	81	77	79	77	8.0	ne.	4	10 0.65
5.	30.02	29.95	30.01	77	81	77	84	77	69	70	6.0	ne.	4	8 0.01
6.	30.02	29.97	30.02	76	81	77	84	76	66	71	6.9	ne.	3	3 0.00
7.	30.02	29.97	30.07	75	82	77	85	72	64	74	7.1	ne.	4	3 0.05
8.	30.07	30.00	30.06	76	83	75	85	75	67	80	7.4	ne.	4	3 0.03
9.	30.04	29.97	30.08	76	81	77	82	76	69	70	7.4	ne.	3	4 0.06
10.	30.04	29.98	30.06	75	83	77	85	75	64	70	7.2	ne.	4	4 0.03
11.	30.06	29.99	30.05	74	83	73	86	70	64	74	6.9	ne.	4	4 0.00
12.	30.08	29.96	30.02	75	84	74	85	71	67	74	7.3	ne.	3-0	3 0.00
13.	30.02	29.97	30.00	71	74	76	85	69	67	74	7.2	w-s-e.	1	9-3 0.00
14.	30.02	29.93	29.99	76	82	77	84	74	64	65	6.9	ne.	4	3 0.09
15.	30.00	29.93	30.01	74	82	77	84	72	70	70	6.8	ne.	3	4 0.02
16.	30.00	29.94	30.00	74	82	76	84	72	75	78	7.5	ene.	4	4 0.13
17.	30.04	29.99	30.08	74	82	77	84	74	82	70	7.5	ene.	5	8 0.17
18.	30.09	30.04	30.10	76	82	75	84	76	64	80	7.0	ne.	3	4 0.04
19.	30.11	30.05	30.10	76	80	76	82	73	79	76	7.4	ne.	3	9 0.19
20.	30.10	30.04	30.08	74	79	76	82	73	67	67	6.9	ne.	5	4 0.30
21.	30.10	30.03	30.08	73	75	75	79	71	80	77	7.4	ene.	4	10-7 0.10
22.	30.06	30.00	30.06	74	79	76	82	73	73	74	7.2	ne.	3	5 0.15
23.	30.06	29.99	30.05	72	82	78	84	72	72	75	8.0	ene.	3	5 0.08
24.	30.06	30.00	30.06	72	82	77	85	71	65	74	7.7	ene.	3	4 0.13
25.	30.05	29.97	30.04	75	81	75	84	74	70	77	7.6	ene.	0-4	2 0.01
26.	30.04	29.98	30.04	70	82	76	85	69	69	75	7.7	s-ne.	1-3	2-5 0.11
27.	30.02	29.95	30.02	75	84	75	85	72	65	83	7.5	se-ne.	2	3 0.00
28.	30.01	29.95	30.01	70	88	75	83	70	80	80	8.0	sw-ne.	2	4 0.35
29.	30.02	29.94	30.02	75	84	78	86	71	68	75	7.8	e.	3	4-0 0.06
30.	30.03	29.96	30.04	78	83	78	85	77	68	69	7.4	ene.	3	3 0.00
31.	30.01	29.97	30.04	78	82	77	84	77	68	67	7.1	ne.	3	3 0.00
	30.04	29.98	30.04	76	81	78	85	75	65	65	6.7	ne.	4	4 0.00
	30.04	29.97	30.03	74.8	81.2	76.4	83.7	73.4	69.8	74.0	7.6	.....	3.8	4.8 2.87

The monthly summary for August is: Mean temperature, 77.5; the normal is 77.8; extreme temperatures, 86 and 69. Two directions of wind, connected by a dash, indicate change from one to the other; also same for force.